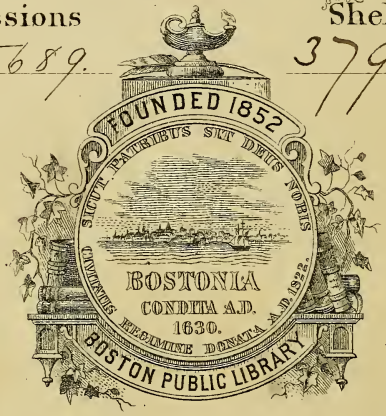
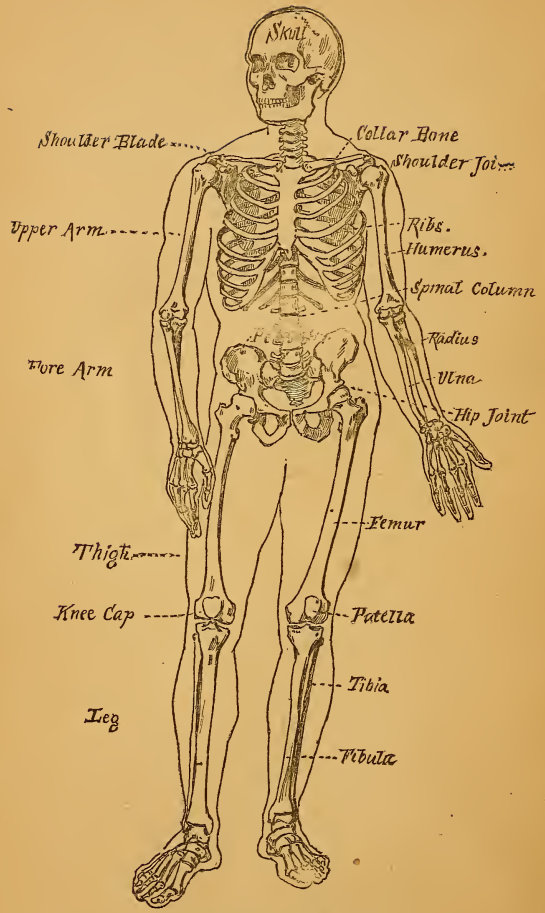
In Case of Accident





THE BONES. *Fig.* 1.

IN CASE OF ACCIDENT

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CONTENTS.

IN CASE OF ACCIDENT.

I.—THE BONES.

A FEW years ago I gave a series of practical talks on Personal Hygiene, emergencies, etc. These talks were for the benefit of the ladies' class at the Sanatory Gymnasium, in Cambridge. In many instances, the information given has been put to service in rendering timely aid, and preventing serious if not fatal results.

My object in giving these talks was to supplement physical training with a little practical information upon self preservation in time of danger, and to teach a few of the simplest methods of meeting the common accidents and emergencies of life.

Scarcely a day passes but some such information and training would be of immense value.

The first requisites in moments of peril to yourself

or to others, are coolness, presence of mind, and above all a ready knowledge of what to do, and what not to do.

Many persons of superior intelligence are rendered powerless in time of excitement and of danger by the want of a little self control.

Others are moved to do something, but having very vague notions as to the correct thing to do, are as apt to do the wrong thing as the right, and in this way work harm instead of good.

Let it ever be remembered, that in case of accident and injury, the object is to render immediate service, and in serious cases to keep the person alive until the aid of a doctor can be procured. Any attempt to go beyond this, and to administer drugs or perform operations without a thorough knowledge of medicine and surgery will be likely to result disastrously. For this reason I am convinced that a few facts well understood, and at ready command, are worth more to the non-professional than more extensive, and to them, impracticable information.

In order to proceed intelligently with any treatment which has to do with the body, it is necessary to know

something of its structure and also of its organization.

I purpose, therefore, making the structure and function of different organs and parts of the body, the basis for a brief consideration of some of the injuries and accidents that may interfere with the function of these various parts, and in so doing, impair the health and endanger life.

THE BONY FRAMEWORK.

This is composed of over two hundred separate bones of different sizes and shapes, all united so as to form one complete whole, which is termed the *skeleton* (*fig.* 1). The uses of the skeleton are to afford protection to the soft tissues, and vital parts, to furnish a basis for their support, and to supply levers by means of which the body, and its various members, may be moved.

In accordance with this design, the head and trunk are surrounded principally by flat and irregular bones, the base of the skull and pelvis by shelving, bowl-shaped bones, and the arms, legs, fingers and toes by long, slender bones.

All of the bones are constructed so that they will

have the greatest amount of strength with the least amount of material. The flat bones are therefore made of two thin plates of hard substance, with soft spongy material between; the bowl-shaped and irregular bones are constructed after the same design, while the long bones are made cylindrical, with layers of hard bone on the outside, soft spongy bone within, and a soft substance called marrow in the central cavity.

FIG. 2.

THE HEAD

is composed of twenty bones, which are closely united and immovable, with the exception of the lower jaw.

The arched construction of the skull affords an admirable protection for the brain, while the irregular bones of the face furnish similar protection and sup-

port for the organs of seeing, hearing, smelling and tasting.

THE SPINAL COLUMN

is made up of twenty-four separate bones, called *vertebræ*. Each bone consists of a solid piece of bone termed the body; a more or less oval or disc-shaped piece of bone, and side and back processes for the attachment of muscles. When these bones are united by ligaments, etc., as they are in the body, they form a hollow cylinder or passage-way along the entire length of the column. This passage-way contains the spinal cord, which is a continuation of the brain.

In order to protect the brain and cord from injury, from jumping, falling, etc., and at the same time allow freedom of movement to the spine, there are soft pads or cushions between each vertebra. These serve as buffers, and give to the column as much elasticity as is compatible with strength.

THE THORAX OR CHEST.

To the middle and upper portion of the spinal column, twelve pair of thin, curved-shaped bones are

attached, termed ribs. Twelve of these project from each side and curve around the body; the fourteen upper ones, seven on each side, are joined to the breast bone or sternum, the five lower ones on the right side, as well as the five lower ones on the left side, are attached to each other by elastic cartilages.

The cavity thus enclosed is termed the thoracic cavity, which contains those highly important organs, the heart and lungs. These are partly supported at the base by a strong membrane called the diaphragm, which also serves as a partition between the thoracic and abdominal cavities.

THE PELVIS.

At the base of the spinal column is a large, strong, bony cavity called the pelvis. This is composed of two haunch, or hip-bones, and the sacrum or rump-bone. The projecting rims and irregular surface of the pelvis afford firm attachment for the muscles of the back and legs, while the basin-like form of the interior gives admirable support to the intestines, bladder, etc.

The high bones are supplied with deep sockets, into

which the heads of the thigh bones are inserted, and bound by strong ligaments.

THE LIMBS OR EXTREMITIES.

They are divided into two upper and two lower. Each of the upper extremities includes a triangular bone situated at the back of the thorax, called the scapula or shoulder blade, and the clavicle or collar bone, which joins the shoulder blade with the sternum or breast bone. Then comes the humerus or bone of the upper arm proper, which is fitted by a globular head into a socket in the shoulder blade.

To the humerus are attached the two bones of the fore arm, termed the radius and ulna, and to these are added the twenty-seven bones of the hand, comprised in the wrist, hand proper, and fingers.

Each of the lower extremities consists of the femur or thigh bone, the knee cap, the two bones of the leg, called the tibia and fibula, and the twenty-six bones of the foot, seven in the heel and instep, five in the middle of the foot and ankle, and fourteen in the toes.

THE JOINTS.

All of the bones are united by joints. Some are

fixed and immovable like those of the skull, some are slightly movable like those of the vertebræ, and collar bones and breast bone, others are capable of extensive movement as in the arm at the shoulder, thigh at the hip, etc. If the bones moved upon themselves they would grate together harshly, so nature has covered the ends at the joints with smooth cartilages, and provided a sac or membrane filled with synovial fluid for lubricating purposes.

FIG. 3.

The bones are bound to each other at the joints by ligaments. At the shoulder, the hip, and the knee, these ligaments are so numerous as to almost cover the whole joint, forming a complete capsule.

CARE OF THE BONES.

In infancy and childhood the bones are in a plastic condition, and may be twisted and bent with slight fear of breaking. In early youth and manhood they are less flexible, and with increasing age they become brittle. They are made larger and stronger by exer

cise, just as the muscles are. The bones are often protected from injury by the development of the muscles and ligaments which surround them, and hold them in place.

When injury occurs to the bones it is usually in the shape of a fracture or dislocation. This may be caused by an accident in which the person concerned is made the helpless victim of circumstances.

But the greatest number of fractures and dislocations are caused by trivial accidents such as falling on the ice, jumping from a carriage, or being thrown from a bicycle or horse.

Many such accidents as well as more serious injuries, could be prevented by learning how to jump and how to fall.

As a rule, in falling, when you have time to think, do not hold your body and limbs rigidly stiff, or thrust one arm or leg forward to break the force of your fall. But as soon as you find yourself going, take a full breath, relax all of the muscles, or rather put them under half tension by bending the body and limbs slightly, and land if possible upon your hands and feet. In many cases

it is better to roll or tumble instead of attempting to jump. Under such circumstances flex your limbs, and put yourself as near as possible in the shape of a ball. By so doing you will distribute the force of the fall over several parts of the body, and though you may get severely bruised, the chances are that you will be more likely to escape broken bones, and internal injuries.

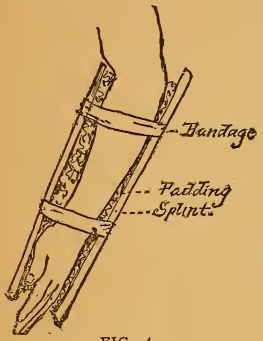


FIG. 4.

In accidents from blows, from stones, or flying missiles, it is often better to protect the body and more vital parts, even at the expense of a broken arm or leg.

FRACTURES.

In case of an accident, ascertain if possible just what has happened. Whether a bone is broken, can easily be determined: 1st., by the persons not being able to raise the limb; 2d., by its being bent or shortened; and 3d., by severe pain. If an attempt be made to move the limb, it will bend where it ought

not, and the broken ends of the bones may be felt grating against each other. Having ascertained the general character of the injury, send at once for a surgeon, first informing the messenger of the nature of the wound, in order that the surgeon may come provided with the necessary appliances.

In the meantime do your best to keep the sufferer as quiet and comfortable as possible. If a limb be broken, motion or handling of any kind will tend to increase the pain and aggravate the injury. If the person suffering is unusually strong, or nervous and excitable, it will be difficult to keep the limb still. On this account, and because of the involuntary spasm of the muscles, which tend to pull the broken bone out of place, it is well to fasten the limb to some sort of support or splint.

FIG. 5.

These can be made out of laths, sticks, stiff cardboard, cigar boxes, canes, and in fact most

anything that will furnish the necessary support.

In order to make them conform to the shape of the limb, they should be thickly wound with strips of cloth, pieces of old sheets, blankets, clothing, etc. On the splints should be placed a padding of cotton wool, tow, flax, straw, grass, etc., to protect the limb from chafing. The pads should be covered with cloth or flannel.

The splints may be fastened to the limb by pocket-handkerchiefs, neck ties, suspenders, strips of cloth, etc. As the special treatment will depend largely upon which bone is broken, let us consider briefly some of those most likely to be injured.

THIGH.

A fracture of the thigh bone will make it impossible for the person to walk or lift his leg. The contraction of the muscles will make the leg shorter, and by pressing the ends of the bones against the soft parts, cause a great deal of pain and much discomfort. If you have any difficulty in securing splints, it is better to make a splint of the uninjured leg by binding the other one firmly to it (*fig.* 2). In this way the sufferer

may be kept quite comfortable until the surgeon arrives.

THE LEG.

The leg, you will remember, is composed of two bones, the tibia and fibula. The latter is the smaller bone of the two, and usually concealed from the touch by the fleshy muscles of the calf. In fracture of the fibula simply apply a bandage around the leg from the knee down. By so doing the tibia will be made to act as a splint.

In case the tibia is broken, it will easily be discovered by the displacement under the skin on the front of the leg.

Make your splints long enough to reach from the knee to the bottom of the foot, then fasten your pads to the splints and bind both to the leg.

THE UPPER ARM.

When the upper arm is broken, get four splints, long enough to reach from the shoulder to the elbow, then fasten the padding to each, and place one in front of the arm, the longest one behind, and one on each side. Secure these with a bandage, and put the

forearm in a sling supported from the neck (*fig.* 3).

THE FOREARM.

In fractures of the forearm, one or both bones may be broken. The treatment, however, is the same. Prepare two splints that will extend from the elbow to the tips of the fingers. Place one on the palm side of the hand, having the upper end at the bend of the arm, and the other on the back of the hand, with the end at the elbow. Fasten the splints in this position, with a bandage (*fig.* 4), place the arm across the body, with the palm inward, and support it from the neck with a large handkerchief or pair of suspenders (*fig.* 3).

THE COLLAR BONE.

When there is a break here, it may readily be detected by comparing the injured bone with the one on the other side. An unusual projection, with a drooping of the shoulder forward, and pain in that region, are indicative of a fracture. Secure a bundle of papers, a billet of wood, or something of the sort, about six inches long, and two or three thick. Take

a coat sleeve or a towel and roll around this bundle until you have made a pad about four inches thick. Put this under the arm next to the injured bone, and bind the arm to the side by passing a bandage around the body (*fig* 5). By pushing the shoulder back, and manipulating the broken bone, it may be put into place before the doctor arrives. But this is work that might better be left to his skill and judgment.

THE RIBS.

If one or more ribs be fractured, it will be made evident by a pain in the affected side when taking a full breath or upon pressure. If there is a fair prospect of having medical attendance soon, and there is no spitting of blood, or bleeding externally, the best thing to do is simply to overlap the undercoat as much as possible, and pin it tight around the body. If you are compelled to wait any length of time for the doctor, let the patient lie on the effected side so as to lessen the action of the ribs in breathing.

DISLOCATIONS.

Where the bones are thrown out of joint, as often happens with the fingers, they may easily be pulled

back into place. And this may often be done in case of dislocation at the shoulder, but as a general rule if the accident has been a severe one, there is danger of complication with a fracture, and under these circumstances, unskilled pulling and tugging at the limb might make the injury irreparable.

Dislocations and injuries at the joints might better be treated by the non-professional as the fractured bones, *except that the limb is usually kept straight.* Injuries to the hands and feet can best be treated with cold water applications, and bound with wet cloths.

If possible, elevate the injured member so as to relieve it from the pain occasioned by the blood pressure when it is hanging down. Further care of the broken bone might better be left in the hands of a skilled surgeon, for the process of healing begins at once, and if the bone be well set, it will be as good as new in from three to six weeks. But if the ends of the bones are not properly joined, or if the limb is not kept quiet, the result will be a crooked or shortened limb, necessitating the re-breaking and re-setting of the bone, or the carrying of a deformity for a lifetime.

II.—THE MUSCLES.

THE bones form the framework of the body, and give it stability and firmness.

They also serve as levers to which the muscles are attached to give the body and limbs motion. With this end in view the muscles are distributed throughout the entire system. Some are long and slender, some are short and thick, others are broad, circular or fan shaped, the form of the muscle depending upon the function which it is to perform (*fig.* 1).

As a general thing, the long muscles are placed where a great deal of motion and little strength is required, and the short and thick muscles where a great deal of strength and little motion is needed.

The muscles are made up of bundles of small fibres, somewhat as ropes and cables are made.

The smallest of these fibres have the power of contracting upon themselves when irritated, just as

have some kind of insects. As the fibres are all closely united, the slightest movement is communicated throughout all the bundles and thus the muscle as a whole is made to contract. A muscle having once contracted to move a limb or part in one direction cannot move it that way again until it is pulled out or relaxed by the action of some other muscle which acts in opposition to it.

In order that the muscles may be always ready to act as soon as possible and support the bony framework, they are kept in a state of partial tension.

This is the reason that the ends of the bones are displaced in case of break or fracture, and why it is so difficult sometimes to get a dislocated bone, as the thigh bone at the hip, into its socket.

The contractile power of the strong muscles of the thigh has to be overcome by a greater resistance from without.

The muscles are attached to the bones by means of cartilages and tendons, and the bones are joined to each other by ligaments. The tendons and ligaments are as a general thing unelastic and unyield-

FIG. 1. THE MUSCLES.

ing, although they may be stretched and elongated, if they are subjected to a great strain in early life. What is commonly termed loose-jointedness, is frequently occasioned in this way. This is one reason why boys should be careful not to stretch their limbs too far in contortion exercises, or carry heavy weights for a long time or distance.

It is good for the muscles to be used in moderation, and they generally increase in size and strength in proportion to their employment. But if the muscles are naturally weak, or if they are used too much without relaxing, they lose their elasticity and contractile power, and gradually stretch out, bringing the strain upon the tendons, cartilages and ligaments. In this way round shoulders, drooping head, crooked spines and other deformities are often occasioned.

INVOLUNTARY MUSCLES.

The heart, stomach and intestines are also muscles, but they act without volition, and are termed involuntary muscles.

These muscles can be influenced indirectly by the

will. In taking violent exercise, the muscles of the heart are made to contract vigorously, and the stomach and intestines are often overworked by having an excessive amount of food to digest.

STRAINS.

Not unfrequently the muscles are strained from over exertion, as in taking a very long walk, or in making any unusual physical effort without preparatory training. Such a strain, unless accompanied by nervous exhaustion, is of little consequence. Two or three warm baths, followed by gentle rubbing and rest, generally sufficing to overcome the bad effects.

Sometimes in jumping or in heavy lifting the strain is so severe as to rupture some of the muscular or tendinous fibres. When this is the case, time and rest afford the only cure. If the injured muscle is on the stretch, try to bring the ends of the torn fibres together by straightening the limb, and supporting the muscle with bandages.

Keep the limb in this position until the fibres have had time to unite, which generally requires

from one to three weeks, according to the severity of the strain.

Make no movement of the muscle without the bandages, for fear of lengthening the fibres, and rendering the muscle forever weak and unreliable.

If there is any pain, cold applications once or twice a day will tend to allay it.

CRAMP.

When one is suffering from nervous debility and much wearied from over-exertion the muscles are apt to make spasmodic contractions. The arms, hands, fingers, feet and legs are drawn up without volition, and held as if by an iron grasp. This condition of the limbs is commonly called "cramp."

It is likely to come on while bathing in cold water, or when exposed suddenly to a low temperature. The remedy while in bathing we will speak of when we come to treat of accidents for drowning.

If the cramp is local, affecting only one limb at a time, make an effort to extend the leg or part affected, thus stretching the muscles under the

spasm. At the same time apply warm water if accessible, and rub vigorously with the hands.

If it is cold, dispense with the warm water altogether, and rely upon the friction of the hands. If the cramps are general, affecting all the limbs, put the person afflicted into a hot bath as soon as possible. If such a thing is not to be had, apply hot water to one limb at a time, keeping the rest of the body wrapped in blankets or extra clothing. Rub vigorously with the hands where the affected parts are accessible, and get the patient into a warm bed at the earliest convenience.

SPRAINS.

When the ligaments are injured, we have what is termed a sprain.

It is generally caused by a sudden shock or blow being given to a joint by which the ligaments which surround it are violently wrenched or lacerated. A sprain is so common that it is thought to be of little import; but it is often more serious than a broken bone. Many a useless ankle or knee has been the result of a slight sprain uncared for.

The joint most likely to be sprained is the ankle. Whenever a sprain occurs, lose no time before attending to it, however trivial it may at first appear. If a bad sprain, there will be a great deal of pain at the time, accompanied usually by a feeling of faintness. If at the ankle, sit down and remove the shoes and socks at once. Ascertain from a comparison of the feet whether there has been a fracture or a dislocation. If so, send for a physician as soon as possible, and keep perfectly quiet until he comes. If there is no fracture or displacement of bones, but only an excessive swelling about the joint, send for a pail of hot water. Bathe the foot in this for fifteen to thirty minutes, keeping the water as hot as it can be borne, and applying it with a large sponge or towel. Then wrap the foot with strips of flannel saturated with hot water, and cover this with dry cloths. If any distance from home, do not attempt to walk, but ride in a carriage if one can be procured. If near home you may be assisted in walking by two persons, one on each side. It is better not to touch the injured foot to the ground.

Every step taken after a bad sprain adds a day to its permanent recovery. Complete rest is the only cure for a sprain. This is so important that it is well to consider the advisability of having the foot done up in splints, or a plaster cast, by a physician. If the sprain is not severe enough to warrant this treatment, then put the ankle under the most favorable circumstances and patiently wait for its recovery. Remember that the muscles are connected with the bones by tendons, and that any contraction of the muscles moves the bones at the joints and thus brings a strain upon the ligaments. The movement of a ligament prevents a sprain from healing as effectually as the movement of a bone keeps a fracture from uniting.

To avoid pain and swelling, keep the foot in a raised position, supporting it on a cushion or pillow.

At night, have the clothes at the foot of your bed lifted from your ankle by a piece of barrel hoop supported from the ceiling by a cord. If there is still considerable pain, keep up the hot water applications for a day or two, and cover the ankle

with a layer of cotton cloth saturated with laudanum, before applying the flannel bandage. After the pain and inflammation has subsided, the hot water applications may be abandoned, and cold water used instead.

Hold the ankle under a cold water faucet until it becomes painful, then remove it, rub dry, and apply camphorated oil, arnica, or most any good stimulating liniment, with the hands. This process should be repeated twice a day for two or three weeks, according to the rapidity of the recovery. Do not keep moving the foot to see if it still pains you, or attempt to bear your weight on it with a view to walking without crutches. Provide yourself with these valuable aids, and don't think of walking without them for four or five weeks at least. Unless this situation is taken, a bad sprain may trouble you for weeks, months and years, and permanently unfit you for many of the sports and games that boys delight to indulge in.

A sprain of the wrist, elbow or knee should be treated in very much the same way as a sprain of the ankle, care being taken to use hot water ap-

plications to allay inflammation, and to keep the affected joint as quiet as possible. In sprains of the wrist or elbow the arms should be supported by a sling as in case of fracture.

For a sprain of the knee rest is more important than for a sprain of the ankle. The injured parts must be kept quiet and in place by straps of adhesive plaster, flannel bandages, splints or plaster casts.

III.—THE SKIN.

THE skin forms a thin, elastic covering for the external parts of the body. The outer surface, termed the *epidermis*, is tough, hard, and dry. The inner skin, called the *derma*, or true skin, is sensitive, soft, and moist. In case of an abrasion or irritation of the skin, a fluid is secreted between the outer and inner skin. This is commonly known as a blister. If the abrasion is severe enough to wound the small capillaries beneath the skin, this gives rise to a *blood* blister. If you touch your fingers to a hot stove, or lamp-chimney, you are made aware of the fact by a sensation of pain which is conveyed from the surface through nerves to nerve centres and the brain.

After exercising vigorously for a little while, you have observed that you got very warm, and that your body was covered with perspiration. If you ceased exercising while in this condition, and

did not take the precaution to put on extra clothing, the temperature of the body would perceptibly fall, and you would take cold. Thus you see the skin is quite an important part of the body.

Its outer covering, by its hard and horny nature, tends to protect the more delicate parts from mechanical injury. The blood-vessels and sweat ducts by their timely contraction and expansion regulate the temperature of the body, and keep it constantly at the living standard. The sweat glands secrete waste substances from the blood, and carry them to the surface of the body.

The nerve filaments notify the brain of the skin's contact with excessive heat, cold, or injurious substances.

It is by reason of the important duties which the skin has to perform that any accident or injury to its membranes should be treated with promptness and intelligence.

BURNS AND SCALDS.

Perhaps the most serious accidents which occur to the skin come by way of burns and scalds. As long as we are compelled to deal with fire and

heated fluids accidental burning will take place, and it behooves every one to know what to do until medical service can be procured.

In case the clothes take fire, throw yourself upon the floor, and roll over and over as fast as possible. In this way you may be able to smother the flame by pressure.

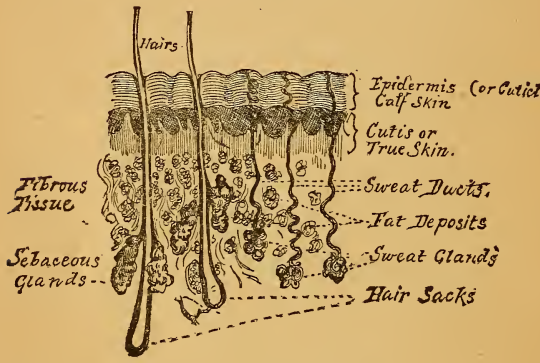
If this accident should occur to another in your presence lose no time in getting him on the floor in a horizontal position.

If there is a mat, shawl, coat, or blanket handy throw them over the victim, taking care to tuck the covering around the neck, so that the flame and smoke will not be inhaled. Now press the covering over the body until you have smothered the flame, then run quickly for a pail of water. Dash this over the body, and extinguish the smouldering embers before they have had time to eat their way into the flesh. This accident is most likely to occur to a woman or child, on account of the light and inflammable nature of their clothing.

The same treatment is applicable in either case.

Prevent running about, protect the throat and lungs by placing a covering around the neck, roll on the floor, then drench the clothing with water.

As soon as the fire has been put out, take the sufferer into a warm room and place him on a



A SECTION OF SKIN.

table, or on the floor. Do not have too many in the room; three will do. Now get a pair of scissors, and begin to cut the clothing up and down the body and limbs so that it will fall off. Do not attempt to pull it off, or you will take a part of the skin with it. If any of the clothing clings to the flesh, let it remain, and cut around it.

If the blisters are very large, and seem likely to

break, puncture them with a needle, and let the fluid escape, but do not remove the outer skin, or you will expose the raw surface.

If the doctor has not yet arrived, get some one to tear up all the old linen or calico which is accessible, dip these pieces into most any kind of oil which is at hand, and place them over the exposed parts. If there is any delay in getting the linen, anoint the burnt surface with butter, lard, or any kind of grease. If these are not at hand, powder it with flour or starch. Cream or oil mixed with lime-water may be used. Do not use *cold* water, if warm water is to be had.

As soon as you have removed the clothing and applied the dressings, put your patient into bed, first taking the precaution to cover the mattress with a water-proof sheet or oil cloth before putting on the under blanket and sheet. Cover the person with clothing enough to keep him warm and comfortable, and wait for the arrival of the doctor.

In case of severe scalding by steam or hot water, drench the person as soon as possible

with cold water, then take him to a warm room and proceed as in case of extensive burning.

BURNS BY LIME, ETC.

Are often more to be dreaded than burns by fire. The superficial skin is not only removed, but the soft parts beneath are often injured. The lime eats its way into the tissues, and destroys everything on its course Being a strong *alkali*, the best way to combat its effects is by means of a diluted acid.

Vinegar, mixed with one half water, will answer, or lemon juice similarly diluted. Apply either of these acids freely to the surface where the lime has burned.

The same treatment is applicable in case of burns from soda, potash, ammonia, or any other alkali.

BURNS BY ACIDS.

Where concentrated acids (such as nitric, sulphuric or vitriol, etc.) come in contact with the skin, a severe burn with an ugly eschar is likely to follow, unless some remedy is immediately

applied. To counteract the effects of the acid, use any alkali that may be at hand, such as soda, lime water, soap, or common earth.

In case of burns from acids or alkalies, use water freely, as every application will tend to dilute them and render them less likely to injure the skin and soft parts.

The after treatment is similar to that used for burns by fire.

FROST BITE.

Next to scalds and burns, frost bite is most likely to occur, and to prove injurious to the skin and underlying parts.

When exposed to the cold for a long time, the blood is driven in from the surface and extremities, and the toes, nose and ears are apt to be frozen.

At the time the person may be unconscious of the fact, and it is possible to be frozen to death without being made painfully aware of the approaching danger.

In case of severe frost bite the person afflicted must be treated immediately. *Do not* take him

into a warm room, but into a *cold* one. Remove the clothing carefully, to avoid breaking the limb should it happen to be frozen. If there is any snow on the ground, rub the frozen part freely with it. If there is no snow, use ice water and wet cloths.

At the first sign of returning animation in the limb, the patient may be made warmer by an extra sheet or blanket. Keep up the surface-rubbing all the time, and do not remove to a warmer room until the circulation is quite thoroughly established. Then warm cloths may be gradually applied, and stimulating drinks, such as cold tea or coffee, may be given.

Slight frost bites, such as often occur to nose and ears, must be treated on the same general plan. The parts must not be warmed, except by very slow degrees. The necessary heat is best supplied by cold applications and gentle friction.

After the doctor arrives he will take measures to prevent the skin from coming off, or mortification from setting in.

IV.—THE BLOOD AND ITS VESSELS.

THE blood is the principle source of vitality. It is composed of a thin watery fluid filled with little red and white cells called corpuscles.

These corpuscles range in size from one-twenty-five-hundreth to one-four-thousandth of an inch in diameter, and there are more than fifty billions of them in the human body. The total amount of blood in the whole system is equal to about one eighth the weight of the body. The red corpuscles are composed largely of oxygen, which is essential to the life of all parts of the body.

FIG. I.

The blood is distributed throughout the body by a system of closed tubes. Beginning with one great branch at the heart, this is gradually divided and subdivided into smaller branches, until they

terminate in a fine meshwork of tubes called capillaries. These capillaries are so numerous that it is impossible to prick any part of the body with the finest needle without wounding some of them. The blood which is sent from the heart through these tubes (arteries) is ladened with oxygen and is termed *arterial* blood.

As soon as it gets into the capillaries their walls are so thin as to allow the constituents of the blood to pass through them and mingle with the surrounding tissues. In so doing certain chemical changes take place in which the oxygen of the blood is consumed, and carbonic acid is produced.

Blood that has lost its oxygen is no longer fit for the nourishment of the body. It must be sent back through the heart to the lungs, where it gives up part of its carbonic acid, and gets a new supply of oxygen.

To carry the blood back to the heart, another system of tubes (veins) is necessary. These begin with the capillaries and gradually grow larger and larger until they terminate in two large trunks which empty into the heart.

The blood thus returned is called *venous* blood, and differs from *arterial* blood in its dark red appearance.

The *arterial* blood is bright red, and inasmuch as it is sent directly from the heart, gushes out in spurts if any of the arteries be wounded.

As the blood is so essential to life and health, any accident which occasions its loss to a great extent, must be regarded as more or less serious.

How to prevent excessive bleeding in case of injury is something which every one should know. For a person might bleed to death before medical aid could be procured.

BLEEDING FROM THE NOSE.

This is the most common and the least dangerous of accidents to blood vessels, but sometimes the bleeding is persistent, and needs to be checked. The best way of doing this is to apply cold water to the neck and face. Hold a sponge saturated with cold water to the nostrils, or if this does not succeed, dissolve a little alum in a basin of water and inject or sniff some of this up the nostrils.

Hold the head back and do not attempt to blow the nose.

BLEEDING FROM INJURY TO THE LIMBS OR BODY.

In case of a wound where there is considerable bleeding use cold applications freely. Small pieces of ice wrapped in a handkerchief are excellent. Before and after such applications can be obtained rely upon pressure immediately over the parts wounded.

If in the hand or arm hold it above the head in a vertical position. If in the foot or leg lie upon the back and elevate it above the body. In both cases you will lessen the flow of blood through the wound.

FIG. 2.

If the bleeding still continues you must try and discover its immediate source and check it.

If the blood is bright red in color, and flows in jets, you may know that an artery has been injured. In this case you must endeavor to stop the flow by exerting pressure upon the artery between the

wound and the heart. Nothing is better for this than the pressure which can be applied by bandaging.

If you have an elastic cord, or pair of elastic suspenders, wind these tightly around the limb, one layer above the other, so that the bandage will press the artery firmly. If you have no elastic, use common cloth, but put one layer above the other for several thicknesses, and when you have carefully secured them, pour cold water on the bandage to shrink it. If you can locate the artery, a stone tied in a handkerchief or a hard knot placed over it, and firmly tied, will sometimes relieve the hemorrhage. But unless you know exactly where the wounded artery is, pressure applied in this way will sometimes do more harm than good.

FIG. 3.

Now a few words as to the location of the important arteries likely to be tributary to a wound.

BLEEDING FROM THE HAND OR ARM.

If the finger or thumb is injured, pressure on

the sides of each will usually cover the arteries of those parts (*fig.* 1).

FIG. 4.

Profuse bleeding from a wound in the hand may sometimes be checked by pressure over the artery on the thumb side of the wrist, where the pulse is usually felt (*fig.* 2).

If not, then pressure exerted on the inner side of the upper arm by gripping the muscle so that the fingers will cover the artery, pressure by a tight bandage, or by a block of wood or a stick placed under the arm (*fig.* 3) will tend to stop the flow of blood to all parts below the elbow.

BLEEDING FROM THE FOOT OR LEG.

Dangerous hemorrhage from injuries to the foot or leg may be checked by pressure over the large artery on the inner side of the thigh (*fig.* 4).

This may be applied by the fingers or thumbs, but as their strength would soon be exhausted, it is better to rely upon the bandage. To get this tight

enough put a stick or cane under the bandage, and twist it around until the bleeding stops.

BLEEDING FROM THE HEAD OR FACE.

Bleeding from a wound in the head or face may be arrested by pressure applied over the artery at the front side and base of the neck just above the collar bone (*fig* 5).

If the injured person faint either from the loss of blood, or from sight of it, or from emotional disturbance caused by witnessing the excitement of others, put him in a reclining position, with the head low and the extremities slightly elevated. As a general rule, do not administer spirits of ammonia, brandy or other stimulants, as they excite the action of the heart and may increase the hemorrhage.

Do not attempt to dress the wound with old rags, flour, whiting, clay, etc., as these substances interfere with the natural, healing process.

Continued pressure is the best means of stopping the bleeding; the dressing had better be left for the doctor to attend to. A clean pocket handkerchief, or a piece of linen or cotton moistened

with cold water may be placed over the injury to protect it from the air, and a pad of the same material may be used with advantage under the bandage to keep the edges of the wound together and help arrest the flow of blood.

FIG. 5.

It must be remembered that a very little blood mingled with water will cause considerable coloration, and lead one to think that more blood is being lost than really is. You must not allow yourself to be deceived by false appearances, and thus lose your self possession. You must show no sign of excitement, but work quickly and with a clear knowledge of what you want to do.

V.—INJURIES TO BLOOD VESSELS.

MANY accidents occur to the skin and soft parts underlying, where there is not so much danger of hemorrhage from the injured blood vessels as that the wound may not readily heal.

In this case the blood is sometimes poisoned, and the system is greatly reduced by its fruitless effort to repair the parts injured. As the manner in which wounds heal is often a matter of grave importance, perhaps a few words in explanation of nature's powers will be of interest.

HOW WOUNDS HEAL.

Nature attempts to heal a wound in two ways:

First, by primary union, or first intention.

Second, by secondary union, or second intention.

By the first method the wound heals quickly,

without suppuration (the formation of pus or matter), and generally leaves but a small scar. This method of healing usually takes place where the wound has been made by a sharp instrument, and is in the shape of a fine cut or incision, where the edges of the wound can be brought together and kept quiet and free from injury and impurity.

The second method of healing usually follows wounds where the tissues are bruised and torn, the result of accidents from jagged instruments, splintered wood, explosives and machinery. Here suppuration takes place, pus and granules of new flesh are formed, and the work of healing goes on more slowly. This mode of healing may also follow a smooth cut, or any ordinary wound where are not the favorable conditions required for healing by the first intention. That is, when the edges of the wound cannot be brought together, and the injured tissues have been irritated by motion, jolting, etc., or the wound been exposed to dirt, and other impurities.

The physician always trys to bring about healing by primary union. Thus you see the necessity for

using plasters, taking stitches, bandaging, etc., in order to keep the edges of the wound together, and how important it is to support the injured parts, and to keep them thoroughly cleansed. This last precaution cannot be dwelt upon with too much emphasis. How frequently it happens that a person who cuts his finger with a penknife, pricks it with a pin, or scratches it with a nail, is afterwards prostrated by blood-poisoning, and is obliged to submit to an amputation of the hand or arm, or lose his life. Sometimes the scratch from a finger-nail merely, may result in consequences which are equally serious. This is because some small particles of dirt, or minute organisms, such as are usually floating in the atmosphere, get into the wound, then into the blood, and so start putrefaction with its train of evil consequences.

Blood-poisoning is the bane and pest of the physician, and he takes every precaution to guard against it. The best way to fight this enemy is with carbolic acid, boracic acid, chloride of zinc, and other substances termed anticeptics. A *weak* solution (remember that they are poisons) of one

of these important agents should be in every household. To cover the wound with a cloth saturated with one of these solutions will preserve the parts from infection, and after stopping the hemorrhage and bandaging, will be the best treatment you can render until the doctor comes.

LACERATED WOUNDS

are those in which a large portion of skin has been destroyed, and it is impossible to get the edges of the wound together. Dirt, shreds of clothing, splinters, or other substances, are apt to be found in these wounds, and they should speedily be removed. They should not be handled roughly, however, but should be washed out with clean tepid water. A pad of lint folded in three or four thicknesses should then be placed over the wound, and a bandage applied gently, as in case of incised wounds.

BRUISES.

Bruises frequently follow falls, and blows with stones or missiles, and may be quite serious in their

nature, even though the outer skin may not be broken. The swelling which usually follows a bruise sometimes conceals a fracture, or a severe injury to the soft tissues. The immediate application of cold water, ice, or some evaporating lotion, such as water of ammonia, camphor, weak tincture of arnica, etc., is the best treatment for alleviating pain and hastening the absorption of the effused blood.

ACCIDENTS FROM MACHINERY.

In an age when nearly everything is done by machinery, accidents from this source are of frequent occurrence. Fingers may be cut off, limbs crushed, skin and muscles torn, etc., rendering immediate aid necessary to prevent the person from bleeding to death. In case of hemorrhage from any limb or part, follow the instructions given in the preceding paper. After the bleeding has been arrested, apply clean linen or cotton pads wet with cold water, and bandage lightly, to support the wounded limb or muscle.

ACCIDENTS FROM GUNPOWDER.

The flashing of loose powder, the explosion of fireworks, the bursting of powder flasks, guns, and small cannon, give rise to accidents more or less serious. In many cases the treatment of such injuries differs little from that of ordinary burns, except where powder has been blown into the face, when an effort should be made to remove it. In case of hemorrhage, stop it as soon as possible by means of cold applications, ligatures, bandages, etc., as previously directed. If fingers or limbs have been blown off, draw the surrounding tissues together, and cover the wound with linen or cotton cloth saturated with clean water.

In case of gunshot wounds, the treatment depends upon the extent of the injury. A rifle bullet, a charge of shot, or a blank cartridge will produce different effects, depending upon the distance from which they were fired. At short range, the bullet and shot make a similar wound; at a longer distance the shot scatter and make several small wounds. When fired at short range, a blank car-

tridge makes the ugliest kind of wound, because both the wadding and powder enter the flesh and tear up larger surfaces.

Where a bullet, shot, or some wadding have entered the body it is necessary that they should be extracted. But this is a task that had better be left to the physician. The immediate treatment of gunshot wounds, however, should be similar to that of the wounds described. Stop the hemorrhage, if any, and cover the wound with cloth wet with clean water.

BITES OF ANIMALS, AND STINGS AND BITES OF INSECTS.

Bites from animals are supposed to be poisonous. Independently of this belief they may be treated as contused and lacerated wounds.

The bite of a dog is most common, and from the fear of hydrophobia, which usually follows it, is apt to be the most serious in its nature.

The bite of a cat, rat or horse is frequently as severe so far as physical injury goes.

Whether hydrophobia is caused directly by the bite of a mad dog or any other rabid animal, is still a disputed question. But as the consequences are so terrible, it is well to take every precaution.

If a person has been bitten by a dog suspected of being mad, lose no time in getting access to the wound. If in the arm or leg apply a ligature above the bite to retard the circulation, then attempt to suck the poison from the wound with the mouth, care being taken that the lips are not chapped or cut, and that the substances extracted be at once ejected. If a physician is at hand he can cut around the edges of the wound and thus get rid of the poison. If no physician is near, the jagged edges, which are most likely to contain the saliva, should be burnt off with a red-hot, or better still, a white hot iron or poker.

The same effect may be produced by touching the wound with a stick of nitrate of silver.

The application of the heat or caustic should be followed by warm fomentations and poultices. Do not have the dog killed until it is proved beyond a doubt whether he be mad. The suspi-

cion that would accompany his death could never be removed, and would add greatly to the distress of the person bitten.

The stings of bees and hornets are quite common in this country, and are frequently followed by great pain and swelling. One of the best and most accessible remedies for insect stings is common salt and water applied freely.

The sting of the adder should be treated in some respects as the bite of a dog. Tie a ligature around the finger or limb, and apply suction to the wound. Follow this treatment with a poultice, and in case of vital depression support the system by the use of stimulants.

THE AFTER TREATMENT OF WOUNDS.

The after treatment of wounds frequently deserves more attention than the first treatment.

Poulticing, bandaging, dressing and cleaning the wound, etc., is almost an art in itself, and is of the greatest importance.

As this would naturally come under the atten-

tion of a physician, we will not consider it here.

Let it suffice to say that rest, cleanliness, a good diet, a pleasant room, and also a cheerful disposition will add greatly to the chances of a speedy recovery.

VI. — THE DRESSING OF WOUNDS.

THE dressing of wounds should as a general thing be left to the care of a physician.

It frequently happens however that a wound does not readily heal under the first treatment, the surrounding tissues becoming dry and hard, swollen and inflamed, so that the tension and pressure produced upon the sensitive parts, often occasion much pain.

To ease this suffering something should be done to soften and relax the tissues and relieve the tension due to the inflammation. Nothing is better for this purpose than a well-made and properly applied poultice.

A poultice that is carelessly made or a poultice incautiously applied, does more harm than good. And as so many home nurses are often called upon to make use of these aids to nature, it is

well that they should receive some hints with regard to them.

MAKING POULTICES.

The best material for poultices is in common use, such as flaxseed, bread, charcoal, yeast, etc.

A cloth that is two inches larger all around than the space to be covered, should first be laid on a heated platter or plate; this will prevent the cooling of the poultice, heat being one of the desired considerations. Upon this cloth place the material selected for the poultice, spread it on evenly, from one quarter to one inch in thickness, according to the requirements of the case.

Now fold the edges of the cloth on to the poultice so as to confine it. Over the top of this it is often advisable to place a piece of thin muslin or linen, so that the poultice will not come in contact with the skin. This is deemed necessary when the material used for the poultice would be likely to irritate the wound. But as a general rule, it is better to apply the poultice to the bare surface of the wound. The intervention of

the linen tends to deprive the poultice of much of its power.

Where it might do harm by adhering to the inflamed parts, a little olive oil should be spread over the surface of the poultice before it is applied.

When the wound is on the face or any other part where it is thought best to limit the special action of the poultice to a small space, cut a hole in the linen covering, merely large enough to allow the poultice to touch the effected part.

APPLYING POULTICES.

A poultice should be applied to the inflamed part as warm as it can be comfortably borne. If the surface be very tender, however, care should be taken to reduce the temperature of the poultice and to apply it gently, one part at a time. After the poultice is applied, the heat and moisture should be maintained as long as possible. To secure this desirable end, a piece of oiled silk or oiled calico should be put over the poultice and the whole held in place by a light bandage. As

soon as the poultice has lost its heat, it should be carefully removed, and another one applied.

Frequent poulticing after this manner for a few hours, is much more serviceable than prolonged poulticing.

If the person can not be frequently attended to, the poultice should be made thicker than usual, and greater precautions taken to retain the heat.

A FLAXSEED POULTICE

Is strongly recommended where a soothing influence is desired and heat and moisture are the great requirements. It is made by sprinkling flaxseed meal in small quantities into a basin or bowl of boiling water. In order that it may not be lumpy it should be constantly stirred until of the right consistency; that is, just thick enough to hold together without running. The quantity of water used should of course be regulated by the size of the poultice desired.

A bread poultice is used for very much the same purpose as the flaxseed, and is perhaps more easily made, though not quite so effective. Take a basin

of boiling water, and into this sprinkle dry, coarse bread crumbs. Stir them constantly for a few moments, then cover the basin with a plate or saucer and let it stand in a warm place for five minutes or so. It will then be ready for use.

A BREAD AND MILK POULTICE

Is made in much the same way. Crumble a slice or two of stale bread into a basin of milk. Place the basin over a fire and let the milk get thoroughly heated, stirring the bread crumbs all the time until they are entirely broken up, drain off the superfluous milk or water and spread the poultice on the cloth prepared for it. To save trouble in making this poultice and the preceding one, the bread should be taken from the centre of the loaf so that it will all be of the same consistency.

Yeast poultices are often used where the parts are slow to heal, and it seems desirable to stimulate them.

To make a yeast poultice, take a pound of linseed meal, or oatmeal will do as well, and mix it

thoroughly with half a pint of yeast or beer grounds. Put this mixture in a basin and place it over a gentle fire. Stir continuously until it is thoroughly heated and of the right thickness, when it can be applied as before.

CHARCOAL POULTICES

Are thought by some physicians to have a disinfecting power and are sometimes used on old wounds and indolent ulcers. They are made by mixing bread, linseed and powdered charcoal in water, and heating them slowly as in the other poultices.

Or they can be made quicker and as well by breaking up the bread and mixing it with the linseed in boiling water, adding the charcoal in about half the quantity just before using it.

MEDICATED LOTIONS

Such as tincture of opium, hemlock, belladonna, etc., are often introduced in poultices when the case demands such treatment, but the home nurse

should not attempt to apply these powerful agents without the advice of a physician.

WARM WATER DRESSING.

It may happen that the exact articles needed for a poultice are not at hand, or that those at hand are of too irritating or stimulating a nature.

Under these circumstances warm water dressings are often very acceptable. Fold a piece of lint four or five times. Dip it into warm water, wring it out and apply it to the wounded or inflamed part. Cover this with a layer of oiled silk in order to retain the heat. To make these dressings effective they should be renewed as often as four or five times in twenty-four hours.

VII.—THE STOMACH.

IN order to sustain life, and to make good the losses of the body resulting from the various kinds of vital activity, food is necessary. This is first introduced into the mouth where it is masticated, and thence conducted through a long muscular tube, called the alimentary canal, into the stomach.

The stomach is a large muscular sac surrounded with blood vessels, nerves, etc., and is closely connected with all the other important organs of the body.

The walls of the stomach secrete an acid fluid, called gastric juice, which exerts a chemical action upon the food and prepares it for assimilation. The stomach is so sensitive that as soon as any substance is introduced into it, its walls contract, and roll this substance about until it is thoroughly mixed with the stomach-juices, after which it

pushes it on into the intestines. Here the nutritive element is taken up by the lymphatics and through them is conveyed to the blood. Anything that interferes with the action of the stomach, either by restricting its movements, checking its secretions or injuring its walls will interfere with digestion; and if the disturbance is very great, will even imperil life. For this reason, too much care cannot be given to the choice of foods. Diseased meat, stale fish, decayed vegetables, etc., often give rise to much distress. Sometimes, too, active poisons are taken into the stomach by mistake. Unless these are quickly removed, the walls of the stomach and alimentary canal are irreparably injured, and death may be caused either by the absorption of the poison into the blood, or by the effect of this poison through the nervous system upon the vital organs.

POISONS.

As many substances now in common use are of a poisonous nature, and as accidents resulting therefrom are of frequent occurrence, a few hints with

regard to the treatment of such cases may be of service.

Poisons may be divided into three classes: Animal, Vegetable and Mineral.

When considering their effect upon the body, poisons may be divided into *Irritants*, *Corrosives*, and *Narcotics*.

The effect of *Irritants* (such as *cantharides*, *chlorine gas*, *carbolic acid*, etc.) upon the tissues is implied in the name. The irritating action takes place in the mouth, the alimentary canal and the stomach.

The *Corrosives* (such as the *caustic alkalies*, and the *mineral* and *vegetable acids*) tend to break down and destroy all parts of the body with which they come in contact.

The *Narcotics* (such as *chloral*, *belladonna*, *alcohol*, etc.), may pass through the throat into the stomach, and thence into the intestines and blood, without doing immediate harm to these parts. The real injury does not begin until the poison introduced into the blood reaches the brain and nervous system.

This knowledge as to the action of poisons at once suggests the nature of the remedy. Before

referring to the treatment of special poisons it will be well to consider briefly the first treatment for

POISONS IN GENERAL.

When poison has been taken into the stomach, ascertain, if possible, its nature; then send for a physician. In the meantime, whatever the nature of the poison may be, efforts should be made to rid the stomach of it.

The old-fashioned way of doing this was by means of the stomach-pump; but as these instruments are difficult to find in time of need, it is not safe to rely upon them.

First, then, try to produce vomiting by running the *finger down the throat*, by frequent draughts of *warm water*, or by a solution of *ground mustard*, or of *common salt*. Mix a tablespoonful of ground mustard in a glass of water. Of this mixture give the person two or three draughts, followed by twice the quantity of warm water. Repeat this dose until vomiting is produced. A tumbler of warm water in which a teaspoonful of salt has been dissolved, often serves the same purpose.

If vomiting is not produced by this means, give emetics. Of these, the most commonly used are *sulphate of zinc* (twenty to thirty grains to a teacup full of water), and *ipecacuanha* (fifteen to thirty grains to a teacup full of water). Follow the use of either of these emetics with frequent draughts of warm water. Hardly too much of this simple remedy can be taken. If there is any difficulty in getting the person to swallow, and if the stomach still retains its poisonous contents, efforts should be made to pour the water down the throat. Sometimes this can be done by means of rubber tubing.

After this tubing is introduced into the throat and extended to the stomach — which is, of course, filled with water — the contents may be forced to run out by holding the mouth of the tube below the level of the stomach. By this means the stomach can be repeatedly and thoroughly washed out.

Some of the poison, however, may already have reached the intestines.

To allay its effects in these parts, large quantities of *milk*, and *white of egg*, should be given; and *flour*, *barley* or *gum arabic waters* should follow some

poisons as soothing lotions. Large doses of *castor oil* are frequently of service in hastening the passage of the poison through the intestines.

When the nature of the poison is known, the right antidote may often be given without dangerous delay.

IRRITANT POISONS.

Iodine. ANTIDOTE: *Starch in water.*

Cantharides. ANTIDOTES: *Emetics*, *opiates* and *demulcents*, but *no oils.*

Phosphorus. ANTIDOTES: *Magnesia*, and *oil of turpentine.*

Chlorine Gas. ANTIDOTES: *Ammonia*, cautiously inhaled, *creosote*, *carbolic acid*, *white of egg* and *albuminous substances.*

Carbonic oxide and other *asphyxiating gases.* ANTIDOTES: *Cold affusions*, *artificial respiration*, and *electro-magnetism.*

Carbolic acid. ANTIDOTE: *Whites of five or six eggs.*

Drastic (active) *carthatics* (such as *jalap*, *croton oil*, *podophyllum*, *elaterium*, etc.). ANTIDOTES:

Opiates, *demulcents* (such as *gum arabic*, *slippery-elm bark*, *starch*, *arrowroot*, *etc.*,) and *stimulants*.

CORROSIVE POISONS.

Ammonia, *soda*, *lime*, *potash*, etc., are very active poisons and tend to corrode and injure the parts with which they are brought in contact. There is no time for the use of emetics. The poison is an alkali, and an acid is necessary to neutralize it. *Common vinegar*, *lemon-juice*, *citric* or *tartaric acid* in solution, and the fixed oils (as *castor*, *sweet*, *linseed* and *olive*) are the best antidotes to alkaline poisons.

Mineral and vegetable acids, *acetic*, *muriatic* and *sulphuric acids* in full strength, are exceedingly corrosive in their effect upon the tissues, and should be combated at once with an alkali. The *carbonates of soda*, *lime*, *potassa* or *magnesia*, may be used as antidotes. The *carbonates of magnesia* and *lime* are the only safe antidotes for *nitric* and *oxalic acid*.

Milk, *oils*, *white of egg*, and *flour and water*, are useful agents to protect the throat and stomach from the action of the corrosive poisons.

Some of the other *Corrosives* with their antidotes are as follows:

Corrosive sublimate, soluble mercurial salts, soluble cupric salts. ANTIDOTES: *White of egg, milk, flour and ferrocyanide of potassium.*

Arsenic, contained in Paris Green and many fly and bug poisons. ANTIDOTES: *Hydrated oxide of iron, hydrated magnesia.*

Lead. ANTIDOTES: *Sulphate of magnesia* or *soda* and other *alkaline* substances.

Nitrate of Silver. ANTIDOTE: *Common salt.*

Zinc. ANTIDOTES: *Albumen, magnesia* and *sodium carbonates.*

NARCOTIC POISONS.

Opium, chloral, alcohol and *calabar bean.* ANTIDOTES: *Emetics, cold affusions, counter-irritation, muscular exercise, strong coffee, hypodermic injections of atropia, artificial respiration.*

Belladonna, hyoscyamus and *stramonium.* ANTIDOTES: *Emetics, cold affusions, cathartics, hypodermic injections of morphia, electro-magnetism.*

Tobacco, aconite, lobelia digitalis, conium and

veratrum viride. ANTIDOTES: *Emetics to empty the stomach, Cannabis Indica, alcohol* and the *diffusive stimulants.*

Strychnia, Veratria. ANTIDOTES: *Opium, conium, tannic acid, camphor, chloral, bromide of potassium, atropia, ether,* or *chloroform.*

It will be observed that many of the antidotes are poisons themselves, and if taken in too large quantities their effects would be injurious.

Powerful remedies, therefore, should be given with caution, and always with the advice of a physician, if one can be had in time to meet the emergency.

VIII. — THE HEART.

THE heart is a hollow muscular organ about the size of the closed fist. It is situated on the left side of the chest, just above the stomach, and is immediately connected with the lungs. The heart is divided into halves, and each half into an upper and lower chamber. The right and left sides of the heart are separated by a partition through which there is no opening; but the two chambers on either side are connected by passage-ways, which are opened and closed by valves.

Leading from each side of the heart are two or more tubes which gradually increase in number, and diminish in size, until they form a complete meshwork; this meshwork extends to every part of the body.

The object of these tubes is to conduct the blood throughout the system. The blood is sent from the

left side of the heart through these tubes to the body, and is returned to the *right* side of the heart, whence it is sent to the lungs, and then to the left side of the heart, etc.

This process is termed the *circulation.*

The force which propels the blood on its way around the body lies largely in the contractile power of the muscles of the heart. The heart in this respect acts very much like a pump. Every contraction of its muscular walls sends the blood onward and conveys to every tissue the elements of life. The impulse which the blood receives from the heart's contraction may be felt at the wrist, arm, and neck, and other parts of the body. Anything that tends to impair the action of the heart, tends to retard the circulation of the blood, while on the other hand anything that invigorates the beating of the heart tends to increase the circulation.

The presence of a full supply of blood to a part is so intimately connected with its health and life that any disturbance of the circulation should be promptly met and remedied. A checking of the

usual flow of blood to the hands, or feet, may not occasion any alarming symptom aside from a feeling of numbness.

But if the flow of blood to the brain and nerve centres is diminished — which often happens — then faintness and loss of consciousness is likely to follow.

FAINTING.

Many accidents not otherwise serious in their nature often give rise to fainting-fits, which unless properly treated may occasion death.

A habit of fainting may be formed, even when there is no aggravating cause for it. But persons who have a tendency to faint at the slightest provocation, are usually troubled with nervous debility, weakness of the heart, or else their system is impoverished for want of a sufficient supply of blood.

The causes which are most likely to occasion fainting in any person whether susceptible or not, are loss of blood from wounds, or internal injuries, blows over the stomach or chest, a sudden shock to

the nervous system from severe fright, or startling news, violent emotional disturbance, drinking iced water or bathing in cold water after being much heated and fatigued, want of food, and fresh air, general weakness etc. Sometimes a feeling of faintness may be occasioned by taking several deep inspirations while in a standing posture. By so doing an unusual amount of blood is suddenly drawn from the brain to the heart and lungs, thus leaving the seat of consciousness poorly supplied with the vital fluid.

The first symptom of fainting depends a good deal upon the immediate cause. A feeling of sickness at the stomach, coldness of the body and extremities, accompanied by dizziness, are perhaps the most common. It often happens that if a faint is anticipated, it can be prevented by bending forward and dropping the head between the legs, or if the opportunity presents itself, by lying at full length in the horizontal position.

If a fainting person is allowed to remain by himself he generally falls to the ground or

floor, and soon recovers unless the cause is a serious one.

TREATMENT OF FAINTING.

This suggests the remedy in most cases: *Put the person in a horizontal position* as quickly and gently as possible.

Do not attempt to support the body in an upright position or to hold up the head, by so doing you make it harder for the heart to send the blood to the brain, and thus aggravate the immediate cause of faintness. If a person is seated in a chair at the time, tip it backward, if you are strong enough to support the weight, and let the back of the chair and head of the person gently down to the floor. The elevated position of the feet and legs under such circumstances might favor the recovery.

If the horizontal position does not bring relief, open the windows, or take the person into the fresh air, loosen the clothes about the neck and chest, and sprinkle the face with cold water.

A bottle of smelling salts held under the nose

for a few seconds at a time, will sometimes stimulate the respiratory function. This remedy, however, should be applied cautiously. Care should be taken to keep persons from crowding around one who has fainted. Fresh air under such conditions greatly favors recovery.

If the attack is much prolonged, and the person does not return to consciousness under the treatment advised, a physician should be sent for.

Be careful to put the person in a reclining position and to use salts only when the face of the patient is pale. If the face is red, or flushed, avoid ammonia and keep the head in an upright position.

Instead of an ordinary fainting fit, it is very likely that you have a case of shock to deal with.

SHOCK.

A mild shock resembles fainting very much, but is a more serious affair. A shock is generally occasioned by some sudden and severe injury such as might be received in a railroad accident, steam boiler explosion, or by a stroke of lightning.

Death is not infrequently caused by shock, where there is no evidence of any injury whatever.

In case of fainting the state of unconsciousness is generally due to depression of the heart's action, whereas in shock this effect may be compounded with interruption of brain and nerve functions.

Sometimes in shock the heart is most affected, sometimes the brain. If the function of the heart is interfered with, the pulse, and respiration will be imperceptible.

If the brain and nervous system is chiefly disturbed, the person will remain insensible, even though the heart is performing its function all right.

The appearance of a person suffering from shock is quite characteristic. Utter prostration, face and lips pale and bloodless, the skin cold and moist, the eyes half closed with no lustre, the pulse feeble, if perceptible, and the respiration sighing and imperfect.

The mind is bewildered, the speech is incoherent,

and sometimes complete unconsciousness and insensibility occurs.

TREATMENT OF SHOCK.

The first thing necessary is to excite the heart and brain to healthy activity. Place the patient in the recumbent position, so as to facilitate the heart's action, then loosen the clothes around the neck and body.

Stimulants are the remedies next required. Hot brandy and water, mixed half and half, and given in teaspoonful doses every minute, until five to ten have been taken, is the most efficacious stimulant. The aromatic spirit of ammonia is sometimes given for the same purpose. The dose is from ten to twenty drops in a teaspoonful of water.

The external application of heat is very desirable. This may be applied to the feet, pit of the stomach, under the arms, and between the legs. The best way is by means of flannels wrung out in hot water, by heated bricks or stones wrapped in flannel, by jugs or rubber bags filled with hot water, and by heated sand bags. As soon as warmth to

the body, and the circulation has been restored, nourishment in the form of beef-tea may be given in small quantities with benefit. If there is a tendency to nausea, this may be allayed by giving the patient a piece of ice in the mouth, or by a two-grain dose of opium. The injuries which occasioned the shock, and the treatment after the emergency is over, better be left to a physician.

IX.—THE BRAIN.

THE brain consists of a soft grayish white substance which is enclosed in the cavity of the skull. Its surface is formed into convolutions, and its interior is composed of a complex arrangement of nerve cells and tissues. It is the seat of the intellectual faculties, the will and the emotions. It is also the seat of the five senses (seeing, hearing, smelling, tasting and feeling), and the function which controls the action of the vital organs.

The brain is put in communication with all parts of the body by a system of nerves. These nerves run down the inside of the spinal column in the form of a large cord. This cord is composed of nerve cells and nerve fibres. The nerve fibres leave the spine in pairs, of which there are thirty-one, and then divide and subdivide until their minute branches extend to every part of the body.

It would be impossible to stick a pin in any por-

tion of the skin without causing pain, which would bring a command from the brain, or spinal cord, to do away with the cause of the injury. The nerves through which the sense of pain, or of feeling, is conveyed to the brain, are termed *sensory nerves;* and the nerves through which a command for movement is sent are termed *motor nerves.*

There is also the system of *sympathetic nerves.* These have their origin in the base of the brain, and extend down in front of the spine in the form of a double chain of ganglia. They are in connection with the organs of respiration, circulation, nutrition and secretion, and preside over the function of these organs.

Any accident to the brain, or spinal cord, will of course be followed by serious consequences.

If the brain is injured, or its function interfered with, insensibility results, and the capacity for feeling, movement and speech is lost.

If the spine is injured, the lower half of the body and limbs are paralyzed.

If the upper portion of the spinal cord, at the base of the brain, is injured, the action of the

heart and lungs is interrupted and death follows.

Sometimes a single nerve, or branch of nerves, is injured, by being cut, torn or compressed. When this happens, the sense of feeling and power of movement is lost in those parts to which the nerve was distributed.

EPILEPSY.

Perhaps the most frequent functional disturbance of the brain (of consequence) occurs in what is called epilepsy. The exact cause of this disorder has never been ascertained, but it is known to be due to some disturbance of the brain and central nervous system, and is constitutional in many persons.

The first indication is often a scream, or an unnatural shriek or cry, after which the patient falls in a state of unconsciousness. There is frothing at the mouth, and a convulsive jerking and twitching of the limbs which at times is so violent as to produce a dislocation. The muscles of the face are spasmodically contracted, and the features distorted.

Treatment. Persons suffering from an attack of

epilepsy should be placed in a horizontal position with the head slightly raised. The latter is especially necessary if the face and neck are flushed. As soon as possible relieve the neck and chest of all tight-fitting garments. If within doors open the windows and let in an abundance of fresh air. Keep back the bystanders who naturally crowd around much to the discomfort of the patient and of those who are trying to be of service.

Little can be done to prevent the spasmodic convulsions, but care should be taken that the patient does nothing to injure himself. If the tongue is extended and in danger of being bitten, it is well to place a cork, or wad of cloth between the teeth. In doing this be careful not to compress the chest, or to interfere with the breathing.

If the head and limbs are jerked about violently efforts should be made to control them. I do not mean by this that an attempt should be made to hold the head and limbs rigidly and prevent all movement. An attempt of this kind would probably increase the convulsive efforts of the patient. A gentle restraint that will simply guide and con-

trol the movements, is all that is necessary. Let one person hold the patient's head, while others grasp the limbs.

After the convulsions cease the patient will remain quiet for a few moments, and then perhaps return to consciousness. At this time try to ascertain his name and residence, should he be a person unknown to you, as he is likely to fall into a profound sleep which may last for hours. During this interval the patient might be taken to his home. On no account, however, should he be left alone, as he might awaken in a state of bewilderment. It would be well for every person who is subject to epileptic attacks to carry his name and address about him with a record of the peculiarities of this disorder and its treatment, sufficiently explicit to be of service to those willing to render assistance.

This disorder though it may not be followed immediately by fatal results, often gives rise to accidents that are more or less serious in their consequences. A fall upon the head from a carriage, on a curbstone, or against a lamp-post, when in a convulsion, is likely to produce an ugly if not

fatal wound. So would a fall against a stone, or any heavy piece of furniture. On this account those who are subject to epilepsy should be carefully watched, that precaution can be taken against accidents and assistance rendered at once.

APOPLEXY.

This accident to the brain is more to be dreaded than epilepsy, for, though less frequent, apoplexy is usually followed by fatal results. It is caused by the rupture of a blood vessel which allows the blood to flow over and into the brain. The patient becomes partially paralyzed and almost immediately passes into a state of unconsciousness. The face and neck are red and swollen, and the breathing soon becomes heavy and stertorous.

Treatment. Efforts should be made to loosen the clothing about the neck and chest, having first slightly raised the head and upper body.

It is important to give the patient plenty of fresh air, and to keep bystanders aside as in epilepsy and fainting.

Cold water, or crumbled ice wrapped in a towel, may be applied to the head and face and, in some instances, may afford relief, but as a general thing, little can be done to restore the patient.

The usual fatality of this misfortune renders it necessary to distinguish it from other conditions of unconsciousness. Where a person has simply fallen in a fit of syncope, or has fainted, as it is commonly termed, the face is deathly pale, the breathing is short and quick, and the pulse is feeble. In apoplexy these symptoms are reversed.

INTOXICATION.

This is a condition which is frequently confounded with apoplexy.

Sometimes a person is found lying on the pavement in a profound stupor. The smell of liquor from his breath, and the general appearance of the clothing lead one to infer that the person is drunk. This would not always be a safe conclusion, however, as apoplexy might occur to a person who had been drinking intoxicating liquor, though not to

excess. In intoxication the helplessness and stupor come on gradually, whereas in apoplexy they came on suddenly.

In the former case the person can be moderately aroused, but in the latter case seldom, if ever. The breathing in intoxication may be heavy, but it is more likely to be quiet.

In apoplexy the breathing is always loud and difficult.

Treatment. Place the patient on his side with his head slightly elevated. Loosen the clothing about the neck as in case of apoplexy. If vomiting does not occur try to produce it by tickling the throat with a feather, or, if the patient can be made to swallow, by giving him a mustard emetic, followed by a profusion of warm water.

In the meantime see that the person is protected from the cold, which tends to deepen and prolong the stupor. If possible get him into a warm room and, what is better, into a warm bed.

If the patient has been for a long time under the influence of liquor the system will be more or less exhausted, and when the stupor is over, the stom-

ach will crave nourishment. This should be given in small quantities in the form of beef tea, yolk of eggs, or warm soups.

If delirium tremens or nervous exhaustion follows, send for a physician.

X.— THE BRAIN. (*Continued.*)

DURING the summer months the most common and serious disturbance of the brain is caused by

SUNSTROKE.

The affection that is usually described under this term, may be the result of intense heat from any source; it frequently arises from long-continued exposure to the artificial heat of foundries, bakeries, laundries, etc., also from close confinement in ill ventilated rooms. But the circumstance under which sunstroke most frequently occurs, is direct exposure to the sun's rays.

The condition of the individual at the time renders him more or less liable to sunstroke. It has been found that those who are intemperate in eating or drinking, and those who are suffering from

general debility, or are exhausted by anxiety or by overwork, are those most likely to be afflicted; while those who are temperate in their habits, and are in general good health are far less liable to sunstroke.

In all cases the peculiar constitution of the individual will influence the nature of the attack. In the full-blooded the effect will be of an apoplectic nature; in the nervous, it will be of the convulsive; in the feeble, and in those wanting in blood, it will resemble a fainting fit.

Sunstroke sometimes occurs suddenly, but it is more commonly preceded by well-marked symptoms, such as violent pain in the head, and a sense of pain and weight at the pit of the stomach. Inability to think, irritability of temper, disordered vision, and difficulty in breathing, are also symptomatic of sunstroke.

The face gradually assumes a livid, bluish tinge; the breathing becomes short and quick, or slow and sighing; the skin is very dry and hot, or else bathed in profuse perspiration, and the beating of the heart is weak and rapid, frequently fluttering.

All of these symptoms gradually become more marked and intensified. Power of motion is lost, insensibility follows, and unless relief is speedily furnished death soon results.

The reason that heating the head or body, should produce consequences so disastrous, has never been determined. It is supposed that the conditions of the blood are changed, so that this fluid no longer nourishes the functions in the brain that control respiration and circulation.

Death occurs from sunstroke through inability of the heart and lungs to perform their office, and the person dies from asphyxia (animation suspended) as surely as he would if drowned or suffocated.

This fact should be borne in mind in attempting to administer relief.

TREATMENT.

As soon as a person is known to have an attack of sunstroke, he should be taken to some cool, shaded place. The ground or pavement, unless

heated by the sun, are generally preferable to an indoor couch. To insure fresh air, avoid crowding around the spot. This is of the greatest importance. Place the patient on his back with the head slightly raised. Loosen the clothing about the neck and chest, having first removed all outer garments. Send for ice at once, and order it broken into fine pieces and thrown into a pail. Add a half-pail of water to the ice, and dash the remainder upon the face and chest of the sufferer. While the ice is melting continue to dash water on the head, neck and chest, in profusion. If water can be obtained already iced, so much the better.

If the surface of the body remains hot, wrap a piece of ice in a cloth and rub the body with it and lay cloths, saturated with iced water, on the neck, chest and wrists, all the time continuing to dash water, a cupful at a time, upon the face and head. As soon as the temperature of the body is lowered perceptibly the application of ice water may be diminished.

When the face becomes pale and the surface of the body grows cold, cease the wet applications,

remove the patient to a dry spot and rub him thoroughly dry.

In *all* cases of sunstroke cold applications are useful at first. Their continuance, however, and the after treatment must depend largely upon the nature of the case.

If apoplectic in its tendency, the face and neck will be dark, and the veins swollen. The breathing will be heavy and loud, and the heart will beat hard. These are bad symptoms, and call for the immediate aid of the physician. In the meantime the most serviceable thing you can do is to raise the head slightly and keep the head and chest drenched with cold water as previously directed.

If the case is of the nature of a fainting fit, the face will be pale, the respiration feeble, and the action of the heart faint. In this case cold water is of service, but should not be used in profuse quantities. It might better be sprinkled or splashed over the face and chest, at short intervals, in hopes of exciting the respiratory muscles to activity. Attempts may be made to revive the patient by the use of smelling salts, or the aromatic spirit of am-

monia, giving ten to twenty drops at a time, in a tablespoonful of water until forty drops in all have been taken. Other stimulants might be given under the direction of a physician, but as they might prove disastrous if administered in an apoplectic case, it would be dangerous to take any chances. Artificial respiration (*see next chapter*) may be resorted to in cases where the breathing has ceased.

PREVENTION.

As so little can be done to relieve a bad case of sunstroke, a few words as to its prevention, may be useful.

As previously stated, the condition of the individual and his circumstances have much to do with his liability to sunstroke.

Alcoholic beverages tend to heat the blood and benumb the sensibilities, and in this way they render a person more susceptible, and more liable to sunstroke.

Eating excessively of stimulating food, or drinking large quantities of cold water (either at or be-

tween meals) during a long period of hot weather, lowers the general tone of the system and is apt to bring on prostration. Let the diet be light and simple during the heat of summer.

The want of fresh air is another aggravating cause of sunstroke. Avoid crowded rooms and thickly settled neighborhoods during hot weather. Get into the country or by the seaside, if only to sleep. If confined to the city take a sponge bath night and morning, and exercise as little as possible during the middle of the day. Wear light, loose clothing. If of only one thickness, flannel is preferable. If obliged to work in the sun, wear a thin straw hat with plenty of ventilating holes in the top and side. A cabbage leaf, or piece of sponge moistened with water and placed in the top of the hat, will afford relief to the head from excessive heat. If driving on a sunny road, or engaged in work upon a roof, or under circumstances where the rays of the sun fall directly on the top and back part of the head, it is well to cover the back of the head and neck with a wet handkerchief. If this can be pinned in the hat and allowed to drop

down behind so as to admit a current of air beneath, so much the better. It will tend to protect an important part of the head — the base of the brain.

Do not be afraid of perspiration, as this will afford relief. On the other hand if you feel uncomfortably warm and do not perspire, a little exercise, followed by a cool sponge-off, is an excellent means of allaying a feverish tendency.

It has been observed that conquering armies in a tropical climate suffer less from sunstroke than defeated armies. As mental depression predisposes to sunstroke this may account for the fact as recorded by military surgeons. Low spirits, anxiety of mind, emotional disturbances, etc., do undoubtedly exercise a depressing influence over the general vigor of the body. Under these circumstances the individual is more likely to succumb to unfavorable conditions.

Get your regular sleep under best circumstances possible.

If you find it difficult to sleep at night, let the cool bath be somewhat prolonged, and darken the

windows so that you may sleep longer in the morning.

Let the first indication of a headache or general uneasiness put you on your guard, and keep you from further exposure until the heat abates, and the bad symptoms disappear.

XI.—THE LUNGS.

THE lungs are two soft spongy elastic bags lying in the chest cavity just above the heart. They are connected with the outer air by means of closed tubes which start from one trunk in the throat, the windpipe, and divide and subdivide into smaller and smaller tubes, as do the branches of a tree.

If you will imagine a tree inverted, and that all its limbs, branches and twigs are hollow, and that the leaves themselves are little hollow elastic bags, the resemblance will be complete. In the lungs these little bags, called air-cells, are surrounded by a network of minute blood capillaries. The walls of the air-cells and capillaries are so thin that there is a constant interchange of gases taking place between the blood and air.

The dark purple venous blood that comes to the lungs from the body is ladened with carbonic acid,

while the air that passes into the lungs from the atmosphere consists largely of oxygen. The blood in the capillaries gives up its carbonic acid to the air in the lungs, and receives from the air oxygen in return. The lungs pump out the carbonic acid, and take in a new supply of oxygen. This process of pumping, or breathing, as it is called, is carried on by the alternate expansion and contraction of the chest.

Oxygen is essential to life, and carbonic acid, beyond a certain quantity, is destructive to it. Therefore, anything that occurs to interrupt the breathing process is quickly followed by results more or less serious.

Let us now consider some of the accidents that are most likely to interfere with the function of the lungs.

DROWNING.

This accident is of frequent occurrence during the summer season. The best means of preventing it is to learn how to swim; by so doing a per-

son is not only better prepared to save himself, but to render assistance to others. The body is lighter than water, and under ordinary circumstances, will not sink if the greater portion of it is kept submerged. The lower part of the face is the only part that need be above the water. But if the arms are thrust into the air, and at the same time the lungs should be emptied by shouting for help, the person is almost sure to go under.

If in attempting to get his breath the unfortunate person swallows water, and plunges about, the risk of drowning will be increased.

As a rule, keep the head well back, breathe quietly, paddle gently with the hands and tread with the feet; thus, even if you do not know how to swim, you can keep yourself afloat a long time or until assistance comes to you.

In attempting to rescue a person who is in danger of drowning, you should be very careful when coming into immediate contact with him, especially if he be heavier and stronger than you. Remember the old adage, "A drowning man will catch at a straw," and throw him something that will enable

you to assist him; an oar, a rope, a fishing-rod, a cane, an umbrella, a neck-tie, one of your braces, a coat, or any article of clothing, will answer for this purpose.

If the person is too exhausted to hold on to an object, you can grasp his foot or hair and thus draw him to the shore. Sometimes, where presence of mind has not entirely deserted the person in danger, he can greatly aid himself by endeavors to do as you direct him. If he would lie quietly on his back, or place both hands upon your hips, it would not be difficult to swim with him. This can be tested and verified, and also rendered easy to do in time of need by practice while in bathing.

If in spite of your best efforts to save the unfortunate person, he sinks to the bottom, you will of course attempt to raise him and get him to the shore before life becomes extinct.

Realize what has happened. The breathing has stopped, the face and neck are purple and swollen with venous blood, and the life of all parts is suspended for want of oxygen. The first essential to

life is to restore natural respiration. There are several ways of doing this.

The method usually employed is known as "Sylvester's method." Before speaking of this it would be well to consider two or three things which should *not* be done.

Do *not* roll the person over a barrel; *do not* place him head downward; *do not* lift him by his legs in view of getting the water from his lungs. These are barbarous practices and do more harm than good.

The person should at first be laid on his stomach, supported by a cushion or bundle of clothing, with the head just low enough to allow the water that has collected in the mouth and throat to run out. The wet clothing should, of course, be speedily removed, and the body covered with blankets or dry clothing.

In order to give the air a free entrance into the windpipe, the mouth and nostrils should be thoroughly cleansed, and the tongue be drawn forward and fastened with an elastic band or strip of cloth passed under the chin.

Neck-tie, braces, collar buttons, and anything likely to interfere with respiration should be taken off.

Sometimes natural respiration may be excited by tickling the throat with a feather, applying smelling salts to the nostrils, or by dashing hot and cold water alternately over the face and chest.

If the person has been for sometime under the water, however, it is better to try artificial respiration at once.

Place the patient on his back on a flat surface with a roll of clothing under his shoulder-blades. Get behind the patient, grasp his arms just below the elbow, and draw them gently and steadily upwards until they meet above the head. By means of this movement the ribs are raised, a vacuum is created in the lungs, the air rushes in, and the process of purifying the blood by giving it oxygen and taking away its excess of carbonic acid has begun.

After keeping the arms in this position about two seconds, they should be brought down to the sides and pressed against the ribs over the pit of the

stomach, and held for two seconds. This movement contracts the walls of the chest, and forces the impure air from the lungs. The upward and downward movements of the arms constitute the act of respiration, and should be repeated about fifteen times to the minute.

This process should be continued until natural respiration begins.

Meanwhile efforts should be made to induce circulation and warmth in the body and limbs. This can be done by vigorous rubbing, by warm bathing, and by beating the body smartly with a towel.

If the breathing continues to improve, get the patient into a warm bed as soon as possible.

Cover him with hot blankets, and apply heated bricks, or bottles of hot water, to his stomach, armpits, thighs, and feet.

As soon as the respiration and circulation have been fully restored, and the patient is able to swallow, warm drinks may be given in small quantities at a time, followed by a little beef-tea or other easily digested nourishment.

As accidents from drowning are frequently attributed to cramps, spasm of the heart, etc., which are induced by unfavorable conditions of the body, a few words of caution to bathers may be of service: Never bathe within two hours after eating; if exhausted from fatigue, or perspiring from exercise.

If simply warm because the temperature of the air is warm, do not stand around to cool off, but enter the water as soon as you are undressed.

Do not remain in the water more than ten or twenty minutes at a time, and leave it before this, if there is the slightest feeling of chilliness.

Persons who are subject to fainting fits, palpitation of the heart, disorders of the circulation or nervous system, should never bathe alone, or swim beyond the reach of immediate assistance. If seized with cramp while bathing make a sudden and energetic effort to extend the muscles under spasm.

SUFFOCATION.

Suffocation, in its effects upon the lungs, resembles drowning; in the one case the passage to the lungs being closed by a gas, in the other by a fluid.

Suffocation is generally caused by the inhalation of noxious gases, such as charcoal vapor, coal gas, water gas, sewer gas, carbonic acid, etc.

Some of these gases are hard to detect by sense of smell, and persons who are exposed to them are often overpowered, before they are aware of their presence. In other cases, a sudden sense of suffocation is felt, accompanied by dizziness and inability to stand. The heart becomes feeble, consciousness grows dim, and death follows unless relief is soon at hand.

When a person is known to have been exposed to noxious gases, the first thing to do is to give him access to fresh air. If he is confined to a room with windows that can be reached from the outside, break them in as soon as possible. Then open the door from the inside and let the air draw through. After a few moments you can enter and remove the patient. Where the room cannot be reached from the outside, it should be entered with great caution. Open all the windows and doors in the adjoining rooms, then throw open the door of the room containing the unfortunate person.

While others are fanning with the doors to create a current of air, take a full breath, then cover the mouth and nose with a wet cloth or handkerchief, and rush to the rescue. Open or break the first window you come to and take another breath of fresh air. While the lungs are inflated, endeavor to drag the suffocated person into another room out of danger.

Then the work of resuscitation should be begun at once. Artificial Respiration is the first essential, and the method of procedure should be the same as described for a case of drowning.

The nature of the noxious gas, if known, should of course guide you in your endeavors. If for instance illuminating gas is suspected as the suffocating medium, you should not enter the room with a light. Upon the other hand, if Carbonic Acid Gas is suspected, a lighted candle will go out if a large quantity of this gas is present. Sometimes sewer gases are inflammable, and many damaging explosions could no doubt be traced to these noxious vapors.

Care should be taken, therefore, in approaching

a room containing any kind of gas whose nature and properties are not clearly understood.

Remember that Carbonic Acid Gas is heavier than air, and when found in wells, cellars, pits, etc., is always strongest at the bottom. Efforts should be made to mix it with atmospheric air by agitating or disturbing it, before attempts are made to rescue those who may be overcome by it. It may be shaken up by throwing large quantities of water into it, by firing a gun over it, or by throwing burning paper, or other inflammable material, into it.

The greatest caution must be taken in endeavoring to rescue a person from a deep hole or cavern containing this deadly gas. The use of a sub-marine armor, such as is employed by divers when working under water, is the only method by which one can render assistance with safety.

XII.—THE LUNGS. (*Continued.*)

SUFFOCATION is often caused by a person inhaling smoke while attempting to escape from a burning building. Most persons who are thought to have been burned to death, have in all probability been suffocated by smoke before the flames reached them. Such accidents are always likely to happen. For building houses of highly inflammable material, introducing elevators, and substituting brick walls for wooden partitions, etc., render death by suffocation so probable that every one should at least familiarize himself with preventive measures.

In going to a strange house it is always well to acquaint one's self with the exact location of all of the stairways and different means of exit in case of fire. If you are on the top floor explore the roof, and examine the gutters and water-pipes to

see if they would offer you a ready means of escape. If you are travelling, it would be a good plan to provide yourself with a stout webbing belt with a ring in it, a couple of smoothly polished hand screw eyes (*Fig.* 1), and fifty or sixty feet of strong hempen cord. With these implements in your possession you could readily effect an escape from a window when danger threatened and other means of exit were not available.

The consciousness of safety that one feels when he has full knowledge of the situation, and confidence in his ability to meet danger, goes far to insure presence of mind, and that complete mastery of self which is so important in case of emergency. To acquire this confidence you should satisfy yourself as to the strength of your rope and belt, the rapidity with which you can insert your hand screw into the window frame, the ease with which the cord would slip through the screw eye and ring in your belt, etc. — in fact make a practical test of your ability to descend from an easy height by means of a rope.

Unless portable fire escapes are put to the test

by actual practice at a safe distance from the ground, they are as likely to do as much harm as good when tried for the first time in moments of excitement.

If you are suddenly called upon to fight your way through smoke, remember that it will not do to inhale it.

This will cause you to gasp for breath and take in more smoke than you would naturally.

If the only way left to you for escape is through the halls which are filled with smoke you must make the best of it. Take a large sponge saturated with water, or a wet towel — the former may be held in the teeth and the latter can be tied around the nose and mouth so as to leave the hands free — fill the lungs with air and start for the stairway or nearest exit, having assured yourself that you are not running into the fire instead of away from it.

If the smoke is very thick crawl on your hands and knees and keep the mouth close to the floor, as by so doing you may be able to get a good breath of air.

Upon reaching the stairs make the descent as soon as possible, sliding down if the smoke is op-

pressive, so as to get the benefit of the air near the surface.

If troubled for breath go to the nearest window and open or break it, and get two or three whiffs of fresh air and start again for the ground floor.

In attempting to descend from a burning building by aid of rope the success of the undertaking depends greatly upon your coolness and presence of mind.

If you are strong in your arms most any kind of rope that you can hang on to will answer your purpose, but such ropes, now that beds are made of slats and wire, are not usually found lying round loose when you want them. For this reason it is better to provide yourself with a strong cord made for the purpose as we have just recommended. To make this contrivance practicable for the use of women and children, a simple harness can be constructed of webbing (*Fig.* 2) that will allow a person to sit in it with as much comfort as in a swing.

Having decided to make the descent first see that your rope is long enough to reach to the ground, or a balcony or roof below, then put in your hand

screw (*Fig.* 3), at the top of the window-frame if you can reach, if not as high up on the side of it as possible. Now put on your harness, pass four or five turns of rope around your ring and tie the end to the hand-screw. See that your rope is free so that it will run through the ring without getting tangled, then grasp the rope below the ring and bear your weight on the harness (*Fig.* 3). The friction of the rope around the smooth polished surface of the ring will make it easy to hold the weight and lower it at will. If the descent is made to a roof or balcony, from which you will have to use your rope to go further, you might better put the end through the eye in the hand screw and fasten it to the ring in your harness or belt. This will enable you to take the rope with you, and use it for a still further descent if necessary to reach a place of safety.

There are a variety of portable fire escapes that may be substituted for this, but all of them should be put to the test before using at any height in case of emergency. When an attempt is made to rescue a person supposed to be in a burning building, the

same precaution should be taken as in rescuing a person from a room filled with poisonous gas. Break in the windows from the outside if possible and let out the smoke, then enter the room as best you can, and bring out the suffocated person.

If necessary to pass near the flames a wet blanket thrown over the head will afford the person protection.

In order to restore a suffocated person to life you should resort to the same methods as employed to resuscitate the apparently drowned, or those asphyxiated by coal gas, etc.

Artificial respiration is of the first importance. Dashing cold water on to the chest will sometimes start up the breathing process and quicken the circulation.

Warm, stimulating drinks should be given where there is great feebleness and exhaustion.

SUFFOCATION FROM CHOKING.

This accident, though not very common, sometimes occurs and a little assistance is of great service,

Those who have a chronic inflammation in the throat, or a slight stricture of the æsophagus, are more liable to accidents from choking than others. The immediate cause of distress is the sticking in the throat of some article of food that presses against the windpipe. If the obstacle in the throat is large enough to obstruct the passage of air through the windpipe, death follows unless relief is speedily at hand. In a severe case of choking the person grows purple in the face, the eyes protrude, the voice becomes unnatural, and the hands grasp the throat spasmodically endeavoring to force the obstacle onward.

Now is the time for assistance. Open the mouth and run the forefinger down the throat and endeavor to dislodge the obstruction. If you find it impossible to do this bend the person over the back of a chair, and strike him forcibly between the shoulder blades two or three times with the open hand.

This will tend to force the air out of the lungs and may start the obstacle from the throat. If this fails and the person can still breathe, perhaps he can be made to vomit. Tickling the palate, or giving him

a little mustard and water may produce the desired result.

While the obstruction resists all attempts to get it out, perhaps it can easily be pushed down towards the stomach.

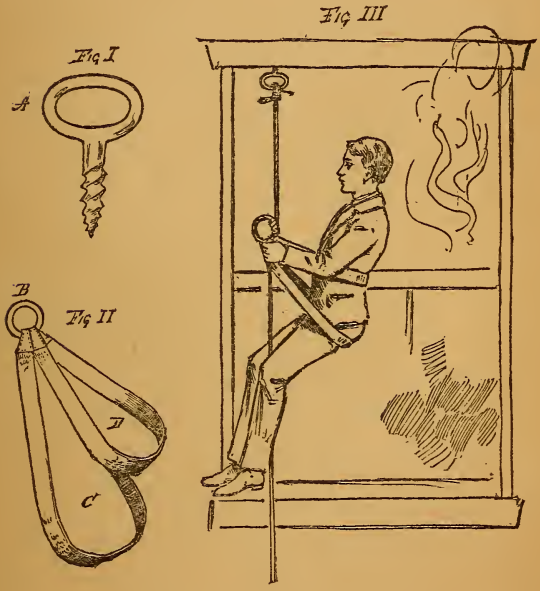
Any piece of elastic material such as rattan, whalebone, etc., can be used to force the obstacle onward. To render this service more effective, the rattan or whalebone should be notched on the end and a piece of sponge about as large as the end of the forefinger should be tied to the stick. After the sponge is well oiled it may be pushed down the throat carrying the obstruction before it. In severe cases of choking send for a physician if one is in the neighborhood, as a surgical operation may be necessary to save life.

METHODS OF CARRYING THE INJURED.

Should an accident occur in the woods or at the sea shore or any remote place, it is often important to convey the injured person to a place of shelter or comfort before a carriage could be obtained,

If a person has received a bad sprain of the ankle or knee, he may be borne on your back with your arms under his legs.

If too heavy for you to carry he may be assisted to walk on the uninjured leg by allowing him to place



one arm around your neck, while you help to support his weight with your arm around his waist.

If the feet or legs have been cut or crushed — it

would be better to hold them in a slightly elevated position.

In cases of this kind the person can be carried as a child if he is a light weight, or if you have others to help you, one may take the legs under the arms with back to the body, while you support the weight from behind with your hands clasped over the chest of the patient. If there are four in the party the person can be borne much easier if two join hands under the body and support the back while walking by the side.

Sometimes one may be borne very comfortably by two persons grasping their own and each other's wrists, thus making a kind of chair, the person being carried supporting the upper part of his body by throwing his arms over the shoulders of those conveying him. If you have to carry a person a long distance, it is better to make a stretcher.

This can be made of two poles seven or eight feet long, or even six feet will do if you have enough assistance to help carry from the side.

Oars, fishing rods, guns, small trees, etc., may be used for this purpose.

Over the two poles throw two or three coats and button them underneath. Over these other garments may be laid that will help support the patient.

If shawls or blankets are to be had they will serve the purpose better. Sometimes branches of trees may be bound together and used as a conveyance, the person lying on the limbs while the boughs are dragged over the ground.

In all cases of severe injury you should consider the probability of getting skilled assistance before attempting to do anything that will imperil life.

Try hard to learn what to do in case of emergency; and in order that your knowledge may not desert you in time of need, practice at leisure what you would wish to do in moments of excitement.

If the time of trial comes, and you are found wanting and know not what to do — the safest rule is to do nothing. Remembering that in many cases where something needs to be done, and you are anxious to serve,

They also serve who only stand and wait.

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